Nanosystems Engineering Research Center for
Nanotechnology-Enabled
Water Treatment

Nano-Environmental Engineering for Teachers (NEET)

Rice University Office of STEM Engagement

Syllabus

January 2017 – April 2017

Instructors

Assistant Director for Biology & Life Science
Christina Crawford, M.S.Ed. 713-348-4761 cc45@rice.edu

Director of Program and Operations
Carolina Avendano, Ph.D. ca9@rice.edu

Project Director
Carolyn Nichol, Ph.D. cnichol@rice.edu

Program Manager
Liz Scroggins 713-348-6398 liz.scroggins@rice.edu

Required Text (provided)

Madden, Andrew. *Welcome to Nanoscience: Interdisciplinary Environmental Explorations, Grades 9-12*. N.p.: National Science Teachers Association, 2011. Print.

Summary of Program

The Nano-Environmental Engineering for Teachers (NEET) course is designed to serve AP environmental science teachers. The purpose of the program is to increase the content knowledge of educators and to empower them in implementing rigorous project-based engineering activities on the topic of water sustainability. We will accomplish this goal through the mastery of environmental science content and the exploration of the most effectively proven "best practices" in educational pedagogy. *Every teacher participant is expected to engage in active discussion and analysis. This requires that every teacher participant complete and critically analyze readings and content activities, as well as evaluate their classroom practices.*

Program Objectives

1. To think reflectively and critically about current teacher practice.
2. To improve secondary teachers' understanding of advance placement and state standards.
3. To facilitate the transformation of teacher practice through the exploration of best practices in educational pedagogy.
4. To disseminate NEWT research conducted at Rice University, Yale, The University of Texas-El Paso, and Arizona State University.
5. To support NEET participants in the application of problem-based learning and engineering practices.

Program Expectations

Participants are expected to complete all components of NEET:

1. Attendance and participation
2. Pre- and post-tests/surveys
3. Program assignments

4. Forum Discussions/Participation
5. End-of-program presentation

Safety Regulations

You must wear the following Personal Protective Equipment (PPE) at all times while in the lab (**no exceptions**)

- Long-sleeved, knee-length lab coat
- Safety glasses/goggles
- Clothing that fully covers yourself to the ankle (pants are best)
- Closed-toe shoes with backs (full coverage shoes are best, high heels are discouraged)

Based on the experiment or procedure, additional PPE such as gloves may be required. Laboratory gloves should only be worn inside the laboratory. Furthermore, the instructor or lab assistant must always be physically present for you to work in the lab. ***You will not be allowed to work in the lab if you fail to meet these safety regulations.***

Attendance

You are expected to attend all course sessions. ***Please sign in and out on the attendance sheet at each class session.*** If class schedule conflicts arise, please contact Christina Crawford as soon as you can.

Surveys

Participants are required to complete several pre-tests and post-tests during the course of the institute as well as institute evaluation surveys.

Assignments

Assignments are designed for students to reflect and apply the knowledge gained in their classroom. They are also devised to monitor the lesson outcomes for both highs school students and teacher in the teachers' classrooms. Completing readings, notes or annotations are a must, so that you will have material to facilitate discussion every week. Any participant with special needs or concerns is requested to speak with one of the instructors as soon as possible. All discussions will remain confidential.

Project-based Lesson Development

Over the course of the program, participants will participate in discussions with the purpose of designing a new product/idea utilizing the engineering design model. Choosing an environmental science related case-study; participants will work in teams to design or update a solution that will address their chosen issue. The NEET staff and contractors will work with participants to assist them in developing their idea and re-designing.

Disability Statement

Any student with a documented disability needing academic adjustments or accommodations should speak with me during the first day of class after class or during office hours. All discussions will remain confidential. I will try to make whatever accommodations are necessary. You will also need to contact Disability Support Services in the Ley Student Center to register. (http://students.rice.edu/students/Disability.asp).

Honor Code

Established in 1912, the Honor Code is one of the most distinct aspects of the academic experience at Rice. Everyone who enrolls at Rice agrees to abide by the code, which covers such matters as plagiarism and giving or receiving aid on exams. Work completed under the Honor Code carries the pledge cited below followed by the student's signature. The Honor Code fosters a spirit of freedom, independence, honesty and mutual trust that exemplifies the academic enterprise at its best. In most courses, students are able to schedule final exams when they want them, rather than having two exams on the same day or three or four in a row. In many cases, exams may be taken in the library or in the students' rooms. Exams for large classes are scheduled for specific times, but even those are not proctored. The student-elected Honor Council oversees the Honor Code and considers reported violations.

"On my honor, I have neither given nor received any unauthorized aid on this (exam, quiz, paper)."

Spring Session Dates

Tuesday Sessions: 6:00 pm – 9:00 pm; Rice University Campus, Room TBD

Nano-Environmental Engineering for Teacher Session Dates			
DATE	**TOPICS** ***(tentative)***	**OBJECTIVE** ***(tentative)***	**HOURS**
01/10/2017	Welcome to NEET	• Pre-Testing • What is NEWT/NEET • Why PBL and Engineering design	**3**
01/17/2017	NEWT Research Thrust 1	• *SLC and NEWT Faculty speaks on research conducted at Rice, ASU, UTEP, and Yale under Thrust 1 • Water Challenges	**3**
01/24/2017	Engineering Design	• Process of Engineering Design • Components of Engineering • The Semester Project	**3**
01/31/2017	RET Lesson Presentation 1	• NEWT RET participant share the experience during the 6-week internship in a NEWT Lab and the lesson developed • Semester Project Case Study Work	**3**
02/07/2017	Project Work NEWT Signature Lesson	• Data Analysis • Nano Materials	**3**
02/14/2017	NEWT Research Thrust 2	• SLC and NEWT Faculty speak on research conducted at Rice, ASU, UTEP, and Yale under Thrust 2 • Lab Tour	**3**
02/28/2017	NEWT Signature Lesson	• Hydrologic Cycle • Naturally Occurring Nanoparticles • Utilizing Engineering Challenges to promote student learning	**3**

Nano-Environmental Engineering for Teacher Session Dates			
DATE	**TOPICS *(tentative)***	**OBJECTIVE *(tentative)***	**HOURS**
03/07/2017	RET Lesson Presentation 2	• NEWT RET participant share the experience during the 6-week internship in a NEWT Lab and the lesson developed	**3**
03/14/2017	No Class	• Spring Break	**3**
03/21/2017	Project Work	• Participants will use class time to work on their water sustainability projects within their teams	**3**
03/28/2017	NEWT Research Thrust 3	• SLC and NEWT Faculty speak on research conducted at Rice, ASU, UTEP, and Yale under Thrust 3 • Lab Tours	**3**
04/04/2017	NEWT Signature Lesson	• Membrane Functionalization • Pros and Cons of Nanotechnology on Water Treatment	**3**
04/11/2017	RET Lesson Presentation 3	• NEWT RET participant share the experience during the 6-week internship in a NEWT Lab and the lesson developed	**3**
04/18/2017	Project Work	• Post Testing • Participants will use class time to work on their water sustainability projects within their teams	**3**
04/25/2017	Presentation Night	• Group Project Presentations	**3**
		TOTAL	**45**

*Student Leadership Council (SLC)